Mary E. O'Dowd, MPH
Commissioner

New Jersey Asthma Awareness and Education Program
Chronic Disease Prevention and Control Services
50 East State Street
Trenton, NJ 08625
(609) 984-6137
www.nj.gov/health/asthma

Chris Christie
Governor

Asthma in New Jersey

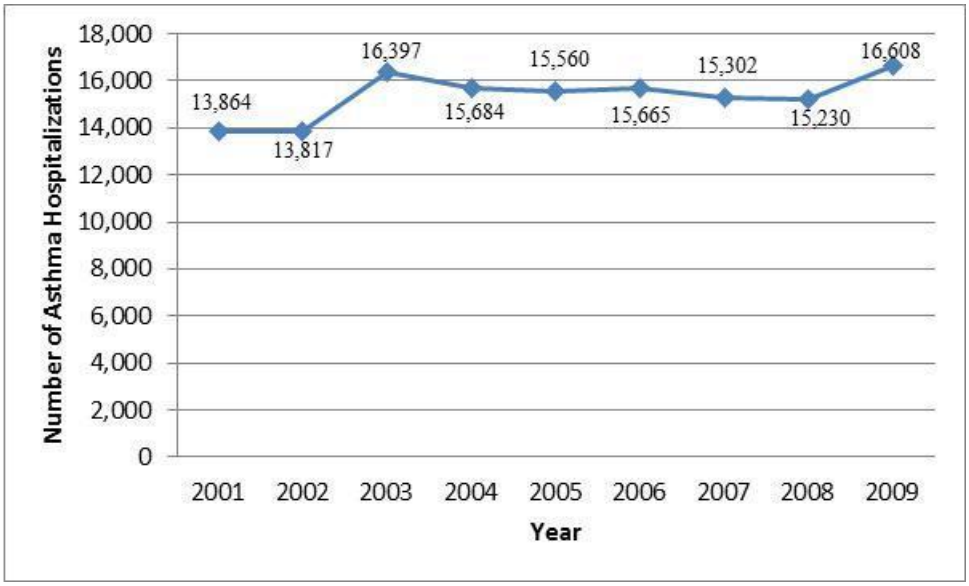
Chapter 6: Hospitalizations

With appropriate management, asthma can be controlled so that most hospitalizations are avoided. The New Jersey Department of Health and Senior Services' (NJDHSS) Asthma Awareness and Education Program (AAEP) monitors asthma hospitalizations using hospital discharge records that are collected and maintained by the Department's Office of Health Care Quality Assessment. Since 1981, hospital inpatient data has been collected in New Jersey through Uniform Bill (UB) patient summaries submitted by all general acute care hospitals in the state. It should be noted that hospital discharge records are collected for billing rather than clinical purposes and that the information presented does not represent hospitalizations occurring at non-acute, specialized, or out of state facilities. Hospitalizations may include multiple admissions for the same person and non-resident hospitalizations are excluded from this analysis.

In this report, an asthma hospitalization is defined as an inpatient discharge with a primary diagnosis in the ICD-9 code range 493.0-493.9.

Figure 1

Number of Asthma Hospitalizations New Jersey, 2000-2009

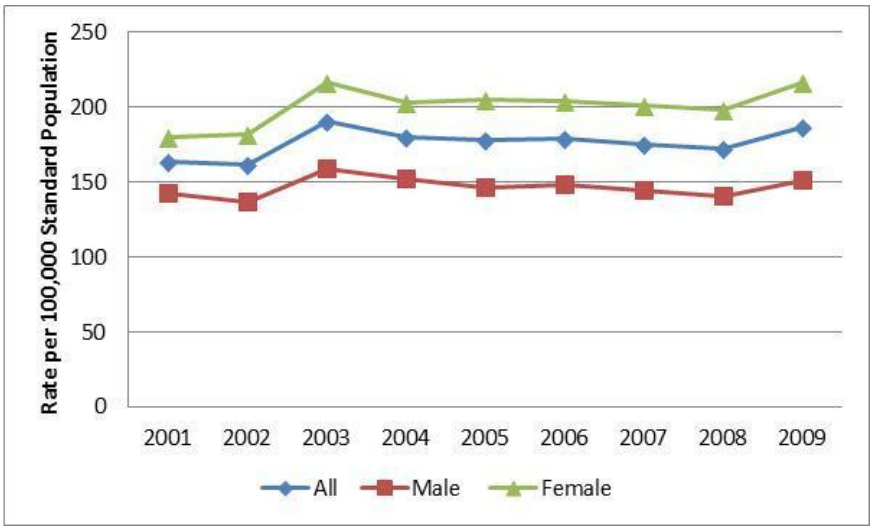


Data Source – 2001-2009 New Jersey Hospital Discharge Files

The total number of asthma hospitalizations per year increased from 2001 to 2009.

Figure 2

**Age-Adjusted* Asthma Hospitalization Rate,
New Jersey, 2000-2009**

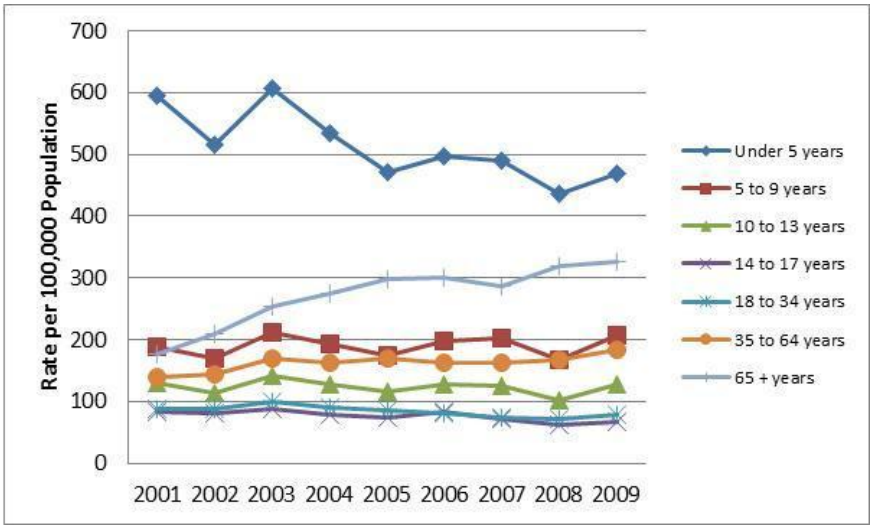


*Direct method of age-adjustment using the 2000 U.S. standard population
Data Source – 2001-2009 New Jersey Hospital Discharge Files
Population Source – Estimates of Resident Population for New Jersey 2001-2009

The annual age-adjusted asthma hospitalization rate increased somewhat from 2001 to 2009.

Figure 3

**Asthma Hospitalization Rate by Age Group,
New Jersey, 2000-2009**

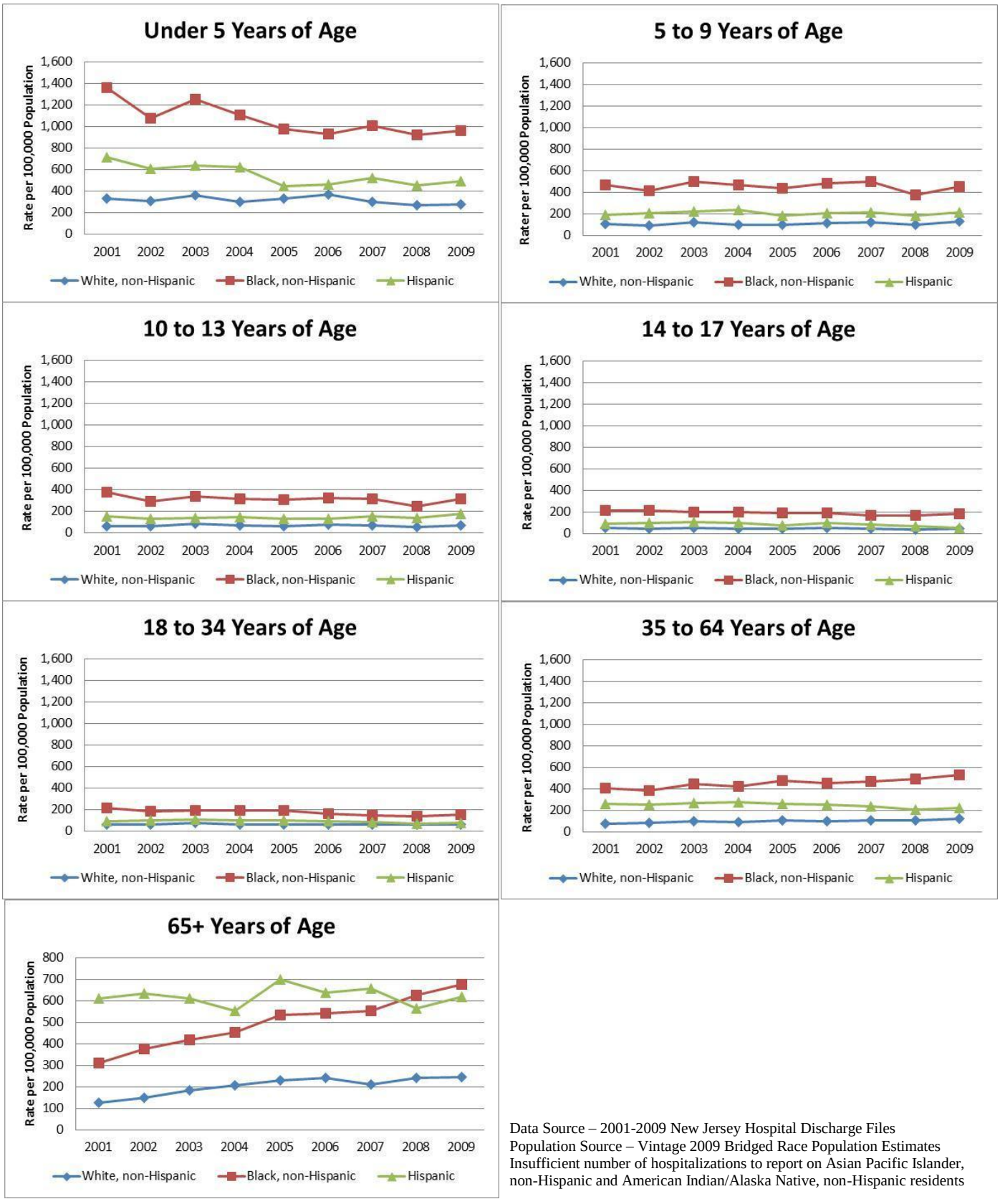


Data Source – 2001-2009 New Jersey Hospital Discharge Files
Population Source – Estimates of Resident Population for New Jersey 2001-2009

The asthma hospitalization rate for children under 5 decreased by about 20% from 2001 to 2009 while the asthma hospitalization rate for adults 65 years and older increased by about 85% from 2001 to 2009. The asthma hospitalization rate for all other age groups remained relatively constant during this time period.

Figure 4

Asthma Hospitalization Rate by Age Group and Race/Ethnicity, New Jersey, 2000-2009

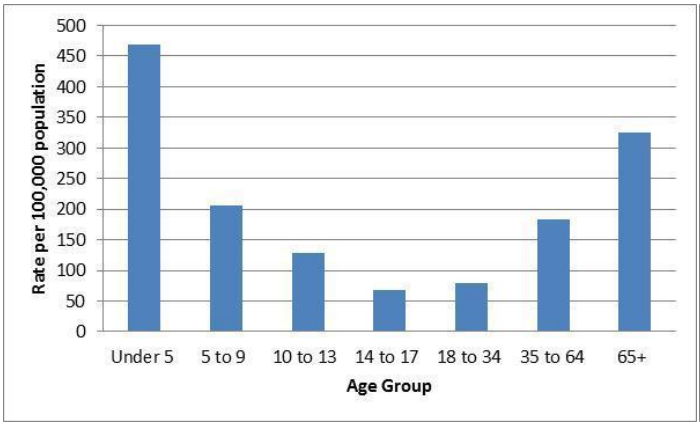


Data Source – 2001-2009 New Jersey Hospital Discharge Files
Population Source – Vintage 2009 Bridged Race Population Estimates
Insufficient number of hospitalizations to report on Asian Pacific Islander, non-Hispanic and American Indian/Alaska Native, non-Hispanic residents

From 2001-2009, the asthma hospitalization rate for some groups increased while the asthma hospitalization rate for other groups decreased. The most notable changes are summarized below:

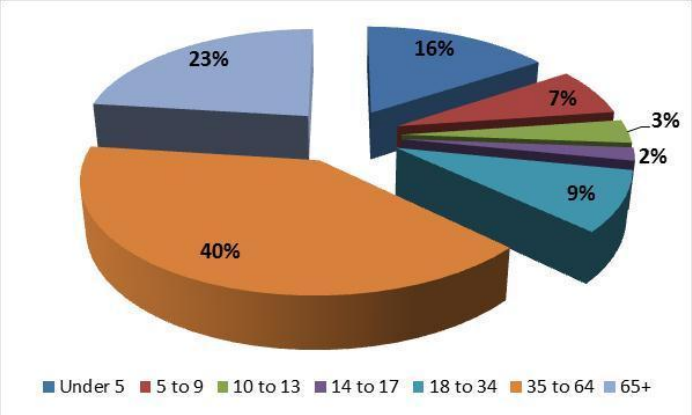
- The rate for black, non-Hispanic residents under 5 years of age *decreased* from about 1,361 asthma hospitalizations per 100,000 population to about 956 asthma hospitalizations per 100,000 population representing an approximate 30% decrease overall
- The rate for Hispanic residents under 5 years of age *decreased* from about 711 asthma hospitalizations per 100,000 population to about 492 asthma hospitalizations per 100,000 population representing an approximate 31% decrease overall
- The rate for black, non-Hispanic residents aged 65 years and older *increased* from about 312 asthma hospitalizations per 100,000 population to about 674 asthma hospitalizations per 100,000 population representing an approximate 116% increase overall
- The rate for white, non-Hispanic residents aged 65 years and older *increased* from about 126 asthma hospitalizations per 100,000 population to about 245 asthma hospitalizations per 100,000 population representing an approximate 95% increase overall

Figure 5a
Asthma Hospitalization Rates by Age Group
New Jersey, 2009



Data Source – 2009 New Jersey Hospital Discharge File
Population Source – 2009 Annual Population Estimates

Figure 5b
Distribution of Asthma Hospitalizations
by Age Group, New Jersey, 2009



Data Source – 2009 New Jersey Hospital Discharge File

Table 1
Asthma Hospitalizations by Age Group, New Jersey, 2009

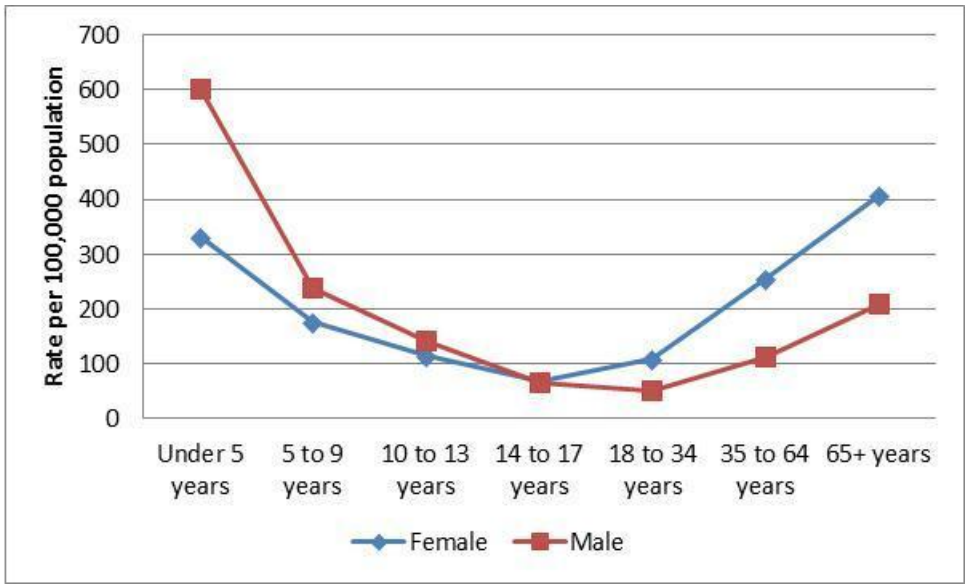
Age Group	Number of Asthma Hospitalizations	Rate per 100,000 Population
Under 5	2,603	469
5 – 9	1,176	207
10 – 13	576	128
14 – 17	320	68
18 – 34	1,470	79
35 – 64	6,641	183
65+	3,822	326
Total	**16,608**	**191**

Data Source – 2009 New Jersey Hospital Discharge File
Population Source – 2009 Annual Population Estimates

In 2009, there were 16,608 asthma hospitalizations among New Jersey residents representing about 1.5% of all resident hospitalizations in the state overall. The highest asthma hospitalization rate by age was for children under five years. In 2009 alone, preschool aged residents experienced 2,603 hospitalizations for asthma. Rates for asthma hospitalization by age were at their lowest point for residents 14-17 years of age and then rose for each consecutive age grouping thereafter. Although preschool children experienced the highest hospitalization rate for asthma, the greatest number of asthma hospitalizations in 2009 actually occurred among residents 35-64 years (6,641). About 40% of all asthma hospitalizations in 2009 involved residents who were between 35-64 years of age.

Figure 6

Asthma Hospitalization Rate by Gender and Age Group, New Jersey, 2009



Data Source – 2009 New Jersey Hospital Discharge File
Population Source – 2009 Annual Population Estimates

Table 2

Asthma Hospitalizations by Gender and Age Group, New Jersey, 2009

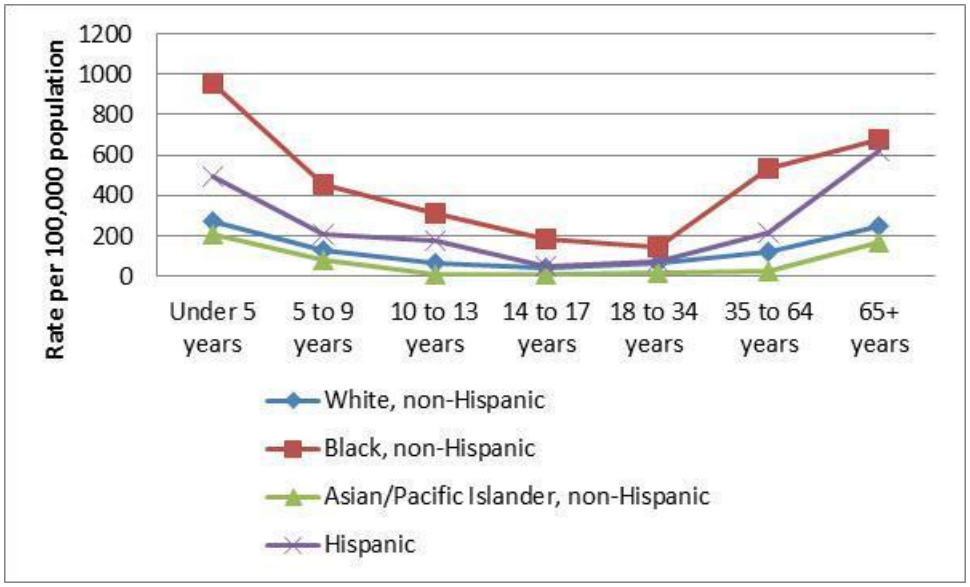
	Females		Males	
Age Group	**Number of Asthma Hospitalizations**	**Rate per 100,000 Population**	**Number of Asthma Hospitalizations**	**Rate per 100,000 Population**
Under 5	901	332	1,702	600
5 to 9	487	176	689	237
10 to 13	249	114	327	142
14 to 17	159	69	161	66
18 to 34	991	109	479	50
35 to 64	4,676	254	1,965	111
65 +	2,805	408	1,017	210
Total	**10,268**	**231***	**6,340**	**149***

Data Source – 2009 New Jersey Hospital Discharge File
Population Source – 2009 Annual Population Estimates
*Rates should be compared cautiously since they are not age-adjusted

The relationship between asthma hospitalization and gender varies by age group. Among children, a greater number of boys were hospitalized for asthma when compared to girls in 2009. However, among adults more women were hospitalized for asthma as compared to men in that same year. The asthma hospitalization rate for boys under 5 years of age was about 1.8 times higher than that of girls under 5 years of age. This male-female rate difference became smaller with increasing age until about 14-17 years of age when the rate actually became higher for females. Among residents 65 years of age and older, the rate for women was about 1.9 times higher than that of men. Females had a higher crude asthma hospitalization rate when compared to males (231 versus 149 asthma hospitalizations per 100,000 population) and the age-adjusted asthma hospitalization rate for females was 1.4 times higher than that of males (217 versus 151 asthma hospitalizations per 100,000 standard population).

Figure 7

Asthma Hospitalization Rate by Race/Ethnicity and Age Group, New Jersey, 2009



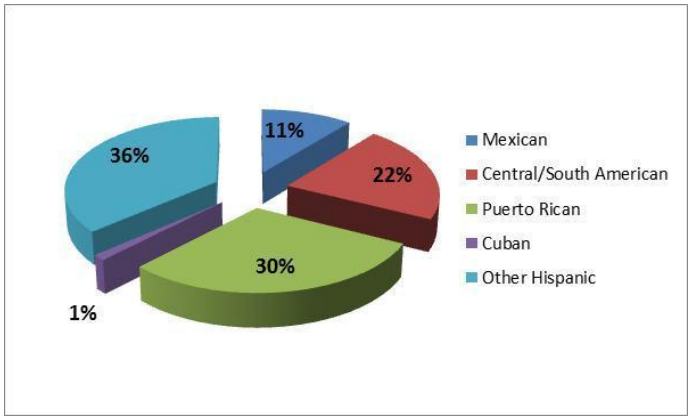
Insufficient number of hospitalizations for American Indian/Alaska Native, non-Hispanic
Data Source – 2009 New Jersey Hospital Discharge File
Population Source – Vintage 2009 Bridged Race Population Estimates

Table 3										
Asthma Hospitalizations by Race/Ethnicity and Age Group, New Jersey, 2009										
	White, non-Hispanic		**Black, non-Hispanic**		**Asian/Pacific Islander, non-Hispanic**		**American Indian/ Alaska Native, non-Hispanic**		**Hispanic**	
Age Group	**N**	**Rate**	**N**	**Rate**	**N**	**Rate**	**N**	**Rate**	**N**	**Rate**
Under 5	733	271	799	956	108	205	9	857	724	492
5 to 9	399	131	380	452	42	81	**	**	265	209
10 to 13	174	67	218	315	5	14	**	**	144	173
14 to 17	111	40	139	181	5	15	**	**	44	52
18 to 34	623	62	439	148	25	15	**	**	300	76
35 to 64	2,802	119	2,394	532	81	28	17	241	1,129	218
65 +	2,217	245	763	674	96	170	7	368	599	620
Total	**7,059**	**131***	**5,132**	**437***	**362**	**52***	**37**	**215***	**3,205**	**221***

N = Number of asthma hospitalizations
Rate = Number of asthma hospitalizations per 100,000 population
*Rates should be compared cautiously since they are not age-adjusted
**Suppressed when the number of hospitalizations is less than 5
678 asthma hospitalizations were reported with other race and non-Hispanic
135 asthma hospitalizations were reported with unknown race and non-Hispanic
Data Source – 2009 New Jersey Hospital Discharge File
Population Source – Vintage 2009 Bridged Race Population Estimates

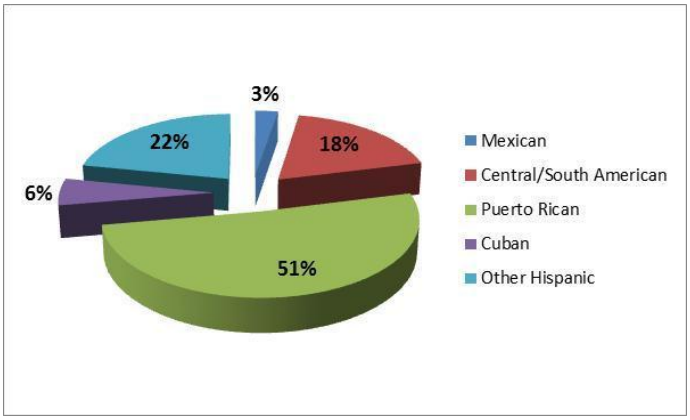
Among children, about 33% of asthma hospitalizations in 2009 were black, non-Hispanic (1,536), about 30% were white, non-Hispanic (1,417), and about 25% were Hispanic (1,177). Among adults, about 30% of asthma hospitalizations in 2009 were black, non-Hispanic (3,596), about 47% were white, non-Hispanic (5,642), and about 17% were Hispanic (2,028). In 2009, the asthma hospitalization rate was highest for black, non-Hispanic and lowest for Asian/Pacific Islander, non-Hispanic across all age categories. The 2009 age-adjusted asthma hospitalization rate was highest for black, non-Hispanic (449 per 100,000 standard population) followed by Hispanic (298 per 100,000 standard population), American Indian/Alaska Native, non-Hispanic (218 per 100,000 standard population), white, non-Hispanic (123 per 100,000 standard population), and Asian/Pacific Islander, non-Hispanic (61 per 100,000 standard population).

Figure 8a
Distribution of Asthma Hospitalizations Among Hispanic Children by Ethnic Origin, New Jersey, 2009



Data Source – 2009 New Jersey Hospital Discharge File
Children includes residents less than 18 years of age

Figure 8b
Distribution of Asthma Hospitalizations Among Hispanic Adults by Ethnic Origin, New Jersey, 2009



Data Source – 2009 New Jersey Hospital Discharge File
Adults include residents 18 years of age and older

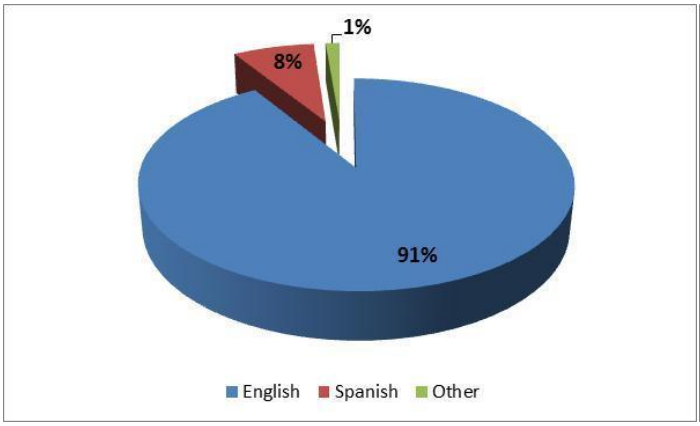
Table 4
Asthma Hospitalizations Among Hispanic Residents by Ethnic Origin, New Jersey, 2009

	Children		Adults	
Ethnic Origin	**N**	**Rate**	**N**	**Rate**
Mexican	128	155	54	42
Central or South American	253	212	375	100
Puerto Rican	353	245	1,037	369
Cuban	15	89	118	163
Other Hispanic	428	543	444	288
Total	**1,177**	**266**	**2,028**	**201**

N = Number of asthma hospitalizations
Rate = Number of asthma hospitalizations per 100,000 population
Data Source – 2009 New Jersey Hospital Discharge File
Population Source – 2009 American Community Survey

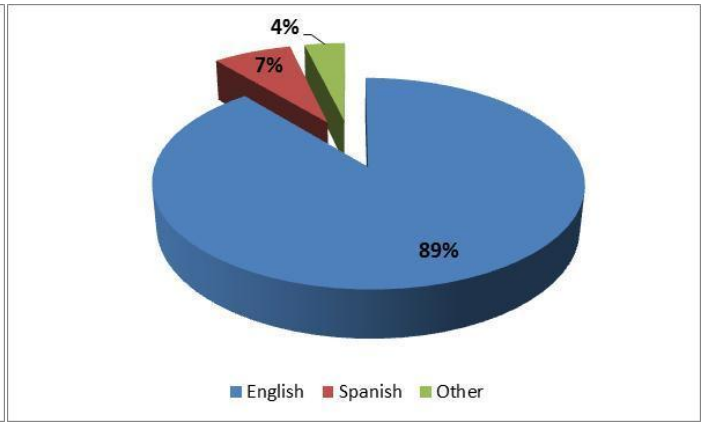
In 2009, the frequency and rate of asthma hospitalizations among Hispanic residents varied by ethnic origin. Among Hispanic children, the highest asthma hospitalization rate was for Other Hispanic (543 per 100,000 population) followed by Puerto Rican (245 per 100,000 population), Central or South American (212 per 100,000 population), Mexican (155 per 100,000 population), and then Cuban (89 per 100,000 population). Among Hispanic adults, the highest asthma hospitalization rate was for Puerto Rican (369 per 100,000 population) followed by Other Hispanic (288 per 100,000 population), Cuban (163 per 100,000 population), Central or South American (100 per 100,000 population), and then Mexican (42 per 100,000 population).

Figure 9a
Distribution of Pediatric Asthma Hospitalizations by Primary Language Spoken at Home, New Jersey, 2009



Data Source – 2009 New Jersey Hospital Discharge File

Figure 9b
Distribution of Adult Asthma Hospitalizations by Primary Language Spoken at Home, New Jersey, 2009



Data Source – 2009 New Jersey Hospital Discharge File

Spanish was noted as the primary language spoken at home for about 7% of both pediatric and adult asthma hospitalizations in 2009.

Table 5
Asthma Hospitalizations by Primary Payer, New Jersey, 2009

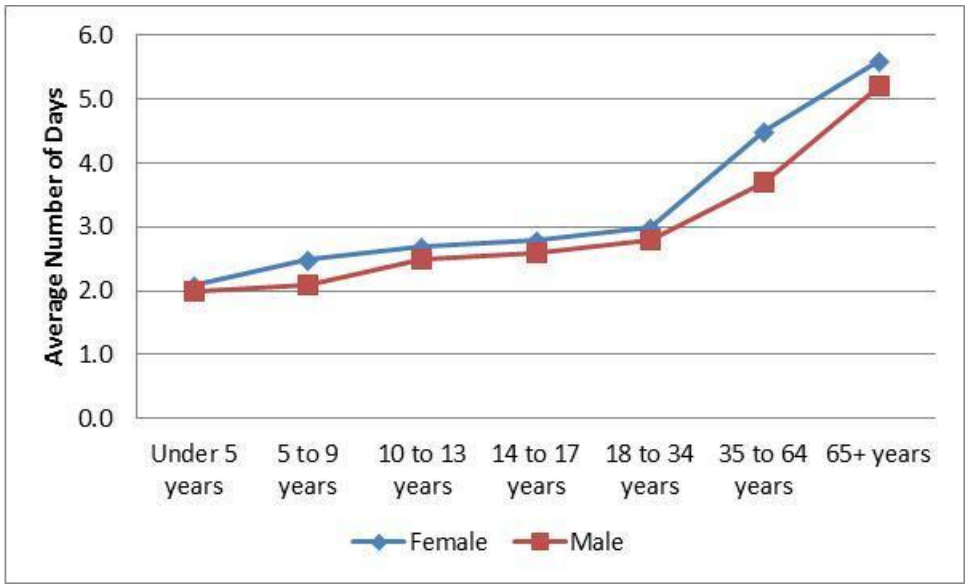
Primary Payer	Number of Asthma Hospitalizations	Percent of All Asthma Hospitalizations	Percent of Payer's Total Hospitalizations
Medicare	4,811	29.0%	1.2%
HMO	4,561	27.5%	1.9%
Medicaid	2,398	14.4%	2.2%
Blue Cross	2,102	12.7%	1.3%
Self-Pay/Indigent Care	2,046	12.3%	2.0%
Commercial	510	3.1%	1.3%
Other	180	1.1%	0.8%
All	**16,608**	**100%**	**1.5%**

Data Source – 2009 New Jersey Hospital Discharge File

Medicare was the most frequently noted primary payer for asthma hospitalizations in 2009 (4,811 or about 29%) followed by HMO (4,561 or about 28%), and Medicaid (2,398 or about 14%). Asthma hospitalizations represented about 2.2% of all resident Medicaid hospitalizations, 2.0% of all resident self-pay/indigent care hospitalizations, 1.9% of all resident HMO hospitalizations, 1.3% of all resident Blue Cross hospitalizations, 1.3% of all resident commercial hospitalizations, and 1.2% of all Medicare hospitalizations.

Figure 10

Average Length of Stay for Asthma Hospitalizations by Age Group and Gender, New Jersey, 2009



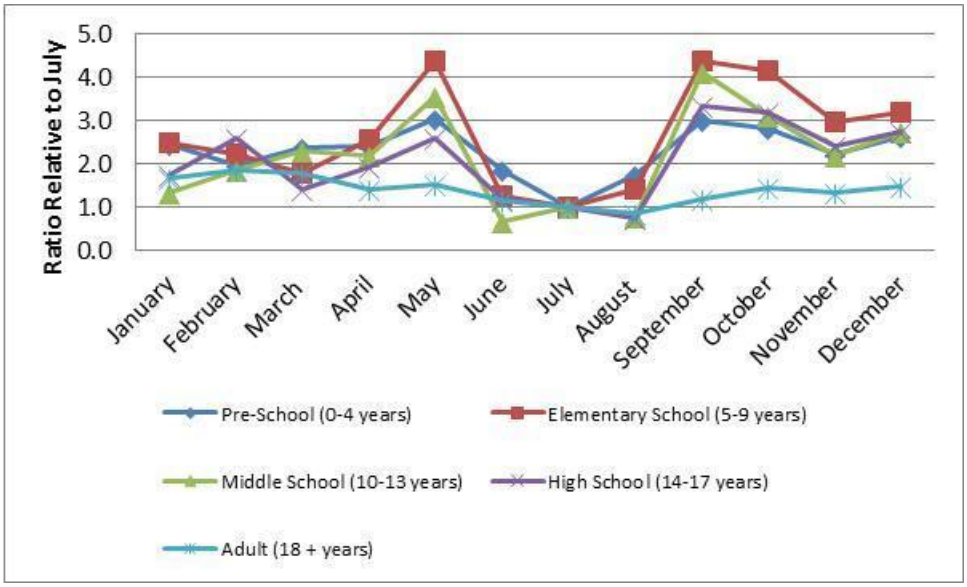
Data Source – 2009 New Jersey Hospital Discharge File

The average length of stay for asthma hospitalizations in 2009 was 3.8 days, but this varied by age and by gender. Average length of stay increased with increasing age and females had a longer average length of stay among all age categories. The average length of stay ranged from 2.1 days for female children under 5 years of age to 5.6 days for female adults 65 years of age and older. The average length of stay ranged from 2.0 days for male children under 5 years of age to 5.2 days for male adults 65 years of age and older.

In Figures 11-12 and Table 6, asthma hospitalizations are reported by month of admission to show seasonal admission patterns. Note that in this section asthma hospitalizations are reported for the year 2008 because any 2009 hospitalizations with a discharge extending into the year 2010 would not be included in the 2009 annual discharge file.

Figure 11

Asthma Hospitalizations by Admission Month Relative to July by Age Group, New Jersey, 2008



Data Source – 2008 and 2009 New Jersey Hospital Discharge Files

Table 6

Asthma Hospitalizations by Admission Month and Age Group, New Jersey, 2008

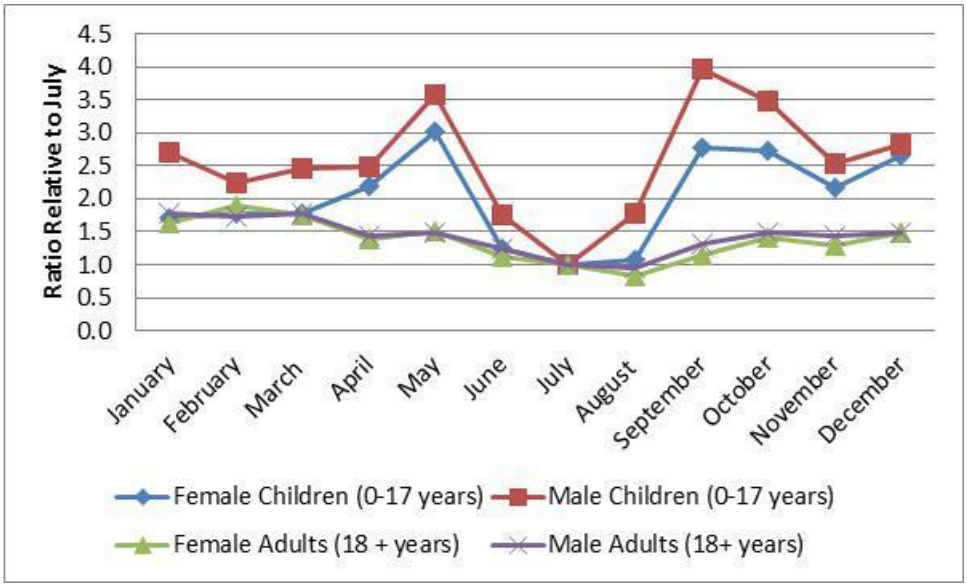
	Number of Admissions (Ratio Relative to July)					
Admission Month	Pre-School Aged (0-4 years)	Elementary School Aged (5-9 years)	Middle School Aged (10-13 years)	High School Aged (14-17 years)	Adult (18 + years)	All Ages
January	218 (2.4)	74 (2.5)	24 (1.3)	21 (1.8)	1,107 (1.7)	1,444 (1.8)
February	173 (1.9)	67 (2.2)	33 (1.8)	31 (2.6)	1,229 (1.8)	1,533 (1.9)
March	210 (2.4)	53 (1.8)	41 (2.3)	17 (1.4)	1,169 (1.8)	1,490 (1.8)
April	213 (2.4)	76 (2.5)	39 (2.2)	23 (1.9)	931 (1.4)	1,282 (1.6)
May	271 (3.0)	131 (4.4)	64 (3.6)	31 (2.6)	996 (1.5)	1,493 (1.8)
June	163 (1.8)	38 (1.3)	12 (0.7)	14 (1.2)	771 (1.2)	998 (1.2)
July	89 (1.0)	30 (1.0)	18 (1.0)	12 (1.0)	666 (1.0)	815 (1.0)
August	153 (1.7)	42 (1.4)	14 (0.8)	9 (0.8)	575 (0.9)	793 (1.0)
September	268 (3.0)	131 (4.4)	74 (4.1)	40 (3.3)	795 (1.2)	1,308 (1.6)
October	251 (2.8)	124 (4.1)	56 (3.1)	38 (3.2)	958 (1.4)	1,427 (1.8)
November	196 (2.2)	89 (3.0)	39 (2.2)	29 (2.4)	881 (1.3)	1,234 (1.5)
December	234 (2.6)	95 (3.2)	49 (2.7)	33 (2.8)	991 (1.5)	1,402 (1.7)

Data Source – 2008 and 2009 New Jersey Hospital Discharge Files

In 2008, the greatest number of asthma admissions overall occurred during the month of February (1,533) and the fewest number of asthma admissions occurred during the month of August (793). Children are more likely to experience monthly fluctuations in hospital admissions for asthma when compared to adults. As a group, they experience a dramatic increase in asthma hospital admissions during the fall and spring months with seasonal peaks most apparent in school age children. For example, the number of asthma hospitalizations that occurred for elementary school age children (5-9 years) in May was about 4.4 times the number that occurred in July. The same was true for the month of September.

Figure 12

Asthma Hospitalizations by Admission Month Relative to July by Gender and Age Group, New Jersey, 2008

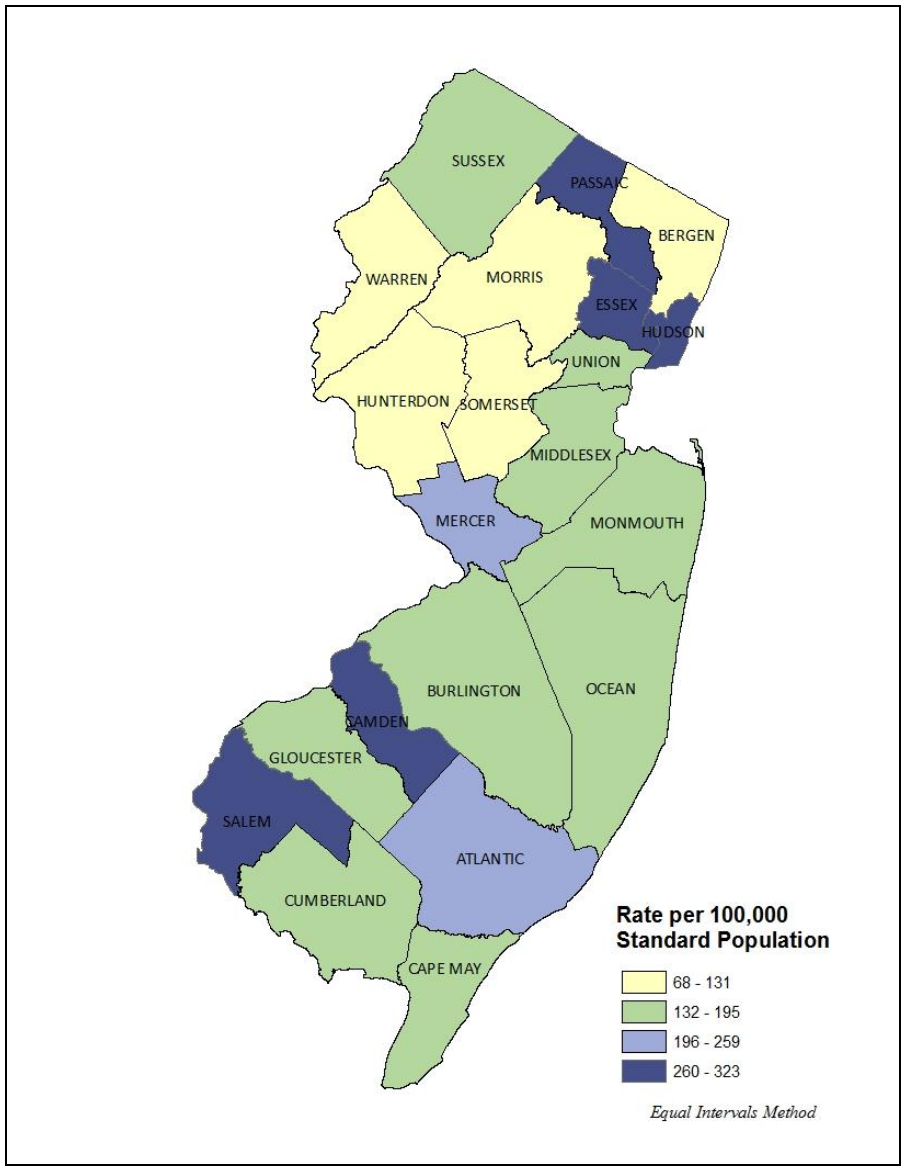


Data Source – 2008 and 2009 New Jersey Hospital Discharge Files

In 2008, both male and female children experienced an increase in asthma hospital admissions during the fall and spring months. For children, the number of admissions was highest during May and September while the number was lowest in July. The ratio of asthma hospital admissions relative to the reference month (July) was higher for male children when compared to female children suggesting that boys could be affected by seasonal factors differently when compared to girls. Seasonal trends in adult asthma hospital admissions were less pronounced and the role of gender in seasonal trends was less apparent when compared to seasonal trends in childhood asthma hospital admissions. For adults, the number of admissions was highest during the winter months of January, February, and March while it was lowest during the summer months of July and August.

Figure 13

Age-Adjusted* Asthma Hospitalization Rate by County of Residence, New Jersey, 2009



*Direct method of age-adjustment using the 2000 U.S. standard population
Data Source – 2009 New Jersey Hospital Discharge File
Population Source – Vintage 2009 Bridged Race Population Estimates

Table 7				
Asthma Hospitalizations by County of Residence, New Jersey, 2009				
County	**Number of Asthma Hospitalizations**	**Percent of Asthma Hospitalizations**	**Rate per 100,000 Population (Crude)**	**Rate per 100,000 Standard Population (Age-Adjusted)***
Atlantic	642	3.9%	236	230
Bergen	1,215	7.3%	136	129
Burlington	850	5.1%	191	190
Camden	1,432	8.6%	277	272
Cape May	168	1.0%	175	174
Cumberland	293	1.8%	186	182
Essex	2,521	15.2%	328	323
Gloucester	421	2.5%	145	145
Hudson	1,606	9.7%	269	286
Hunterdon	92	0.6%	71	68
Mercer	860	5.2%	235	234
Middlesex	1,119	6.7%	142	141
Monmouth	983	5.9%	153	151
Morris	359	2.2%	73	74
Ocean	1,048	6.3%	183	165
Passaic	1,316	7.9%	268	262
Salem	184	1.1%	277	261
Somerset	339	2.0%	104	101
Sussex	205	1.2%	136	148
Union	815	4.9%	155	150
Warren	140	0.8%	128	119
All Counties	**16,608**	**100%**	**191**	**186**

*Direct method of age adjustment using the 2000 U.S. standard population
Data Source – 2009 New Jersey Hospital Discharge File
Population Source – Vintage 2009 Bridged Race Population Estimates

In 2009, the number of asthma hospitalizations and the asthma hospitalization rate varied among the 21 counties of New Jersey. The 2009 age-adjusted asthma hospitalization rate ranged from about 68 annual asthma hospitalizations per 100,000 standard population (Hunterdon County) to about 323 annual asthma hospitalizations per 100,000 standard population (Essex County). Considering all New Jersey asthma hospitalizations in 2009, about 15.2% (2,521) were for residents of Essex County while about 0.6% (92) were for residents of Hunterdon County.

Acronyms:

ICD – International Classification of Diseases

Definitions:

Age-Adjusted Rate – A hypothetical rate that facilitates comparison among populations that differ in underlying age structure. The age-adjusted rates presented here were calculated with the direct method of age adjustment using the 2000 U.S. standard population.

ICD – "A coding system maintained by the World Health Organization and the U.S. National Center for Health Statistics used to classify causes of death on death certificates and diagnoses, injury causes, and medical procedures for hospital and emergency department visits. These codes are updated every decade or so to account for advances in medical technology."[1]

References:

1. New Jersey Center for Health Statistics. Definitions of Public Health Terms and Acronyms, Accessed January 20, 2011. Available : http://www4.state.nj.us/dhss-shad/home/Glossary.html

Acknowledgements:

This chapter was developed by the New Jersey Asthma Awareness and Education Program within the NJDHSS Division of Family Health Services' Chronic Disease Prevention and Control Services. The NJDHSS Office of Health Care Quality Assessment maintains the hospital discharge files.

Contributors:

Melissa Vezina, MPH, Research Scientist, NJDHSS Asthma Awareness and Education Program

Reviewers:

Christina Tan, MD, MPH, NJDHSS State Epidemiologist
Gloria Rodriguez, DSW, MSW, Assistant Commissioner, NJDHSS Division of Family Health Services
Lisa A. Holland, RN, BSN, MBA, Director, NJDHSS Chronic Disease Prevention and Control Services
Laura Hernandez-Paine, Program Manager, NJDHSS Chronic Disease Prevention and Management
Lisa Jones, RN, MSN, Coordinator, NJDHSS Asthma Awareness and Education Program
Uta Steinhauser, MPH, Program Evaluator, NJDHSS Chronic Disease Prevention and Control Services
Research Staff, NJDHSS Office of Health Care Quality Assessment
David M. Mannino, MD, Centers for Disease Control and Prevention

Questions and data requests can be directed to:

Melissa Vezina, MPH
Research Scientist
New Jersey Asthma Awareness and Education Program
PO Box 364
Trenton, NJ 08625-0364
(609) 984-6137

For more information about the NJ Asthma Awareness and Education Program:
www.nj.gov/health/asthma

For asthma resources from the Pediatric Adult Asthma Coalition of New Jersey (PACNJ):
www.pacnj.org

For more information about New Jersey Hospital Patient Discharge Data:
http://www.state.nj.us/health/healthcarequality/ub/ub92intro.shtml

Funding for this effort was provided by the CDC Cooperative Agreement entitled *Addressing Asthma from a Public Health Perspective* 5U59EH000491-03. The contents are solely the responsibility of the authors and do not necessarily represent the official view of the CDC.